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Snapping Turtle
Chelydra serpentina serpentina

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MARYLAND NATURALIST

The Natural History Society of Maryland

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MARYLAND NATURALIST

SNAPPING TURTLE

The cover of this issue is a photograph of the head of the common snapping turtle, *Chelydra serpentina serpentina* by Charles J. Stine. The snapper is the most widely distributed turtle of the 79 species and subspecies of innate North American turtles, ranging over the entire eastern part of the United States, east of the Rocky Mountains.

It is abundantly found in rivers, streams, lakes, ponds, marshes, and swamps throughout Maryland, and is one of the most frequently encountered turtles of our twelve native species. It is also one of the older inhabitants of this state; fossil remains from the Maryland Pleistocene indicate that the snapper has been with us for tens of thousands of years.

A thirty pound specimen is considered large, but there is on record an individual fattened in captivity that tipped the scales at 85 pounds. The maximum shell length is probably fifteen inches. The largest Maryland specimen recorded by Dr. Robert H. McCauley measured 11.8 inches.

The snapper probably breeds in late April in our area, laying about twenty-five eggs during June in a terrestrial depression six inches or so deep. The eggs hatch in $2\frac{1}{2}$ to 3 months.

Despite the fact that the snapper occasionally uses its hawk-like beak and talon-like claws to drag unsuspecting frogs and waterfowl beneath the water, it very seldom preys on these creatures, subsisting mainly on invertebrates and vegetable matter. Dr. Karl F. Lagler, in a study of the snapping turtle in Michigan, has shown that the species does not play a significant role in depletion of game or forage fish populations.

When taken from its element the snapper is a particularly irascible creature, striking out and hissing loudly at the slightest provocation.

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1953

AUG 5 1955

THE MUTE SWAN

Photograph by W. Bryant Tyrrell

SOME OBSERVATIONS ON THE MUTE SWAN

by

Donald Russel Crawford, Jr.

One evening I was watching a family of swans near Woodlawn, Maryland. The air was warm and the sky was filled with gorgeous shades of red and orange from the setting sun. The little swans, known as cygnets, were gathered around the parent bird feeding on the vegetable material from the bottom of the pond-like backwash of the nearby stream. As the little swans fed, they stood on their heads, which were under water; their hind-quarters stood up, while their stubby little wings flopped up and down. Now and then the attending parent swan would stamp the muddy bottom with its feet. Several of the cygnets also were observed to do this in water shallow enough for them. If one of the little fellows got too far away from the group, the adult bird swam slowly towards the wanderer with the rest of its charges. The other parent bird apparently was not very much concerned with the group but was swimming in the stream.

As the rays of the sun slowly left the water, the attending parent bird gradually moved with its charges towards the shore near the nest. The young birds were eased gently by the parent bird towards the grass along the shore. Here they lingered, picking at the grass which was not very high.

Finally, the parent bird went ashore and moved towards the nest. The cygnets followed. The parent bird mounted the rim of the nest and began cleaning its feet and plumage in systematic order. The cygnets, in single file, climbed up the side of the nest; and then, as they approached its top, they spread out in a line around it and mounted its rim. Each of these little birds shook the water off itself and then tried to clean its body in the manner of the parent bird. After this was finished, the little ones moved around the rim of the nest and began to settle down in it, the parent bird having taken a sitting position in the nest. Three of the cygnets climbed upon the rump of the parent bird and crawled under its wings. The entire procedure, after they had left the water, required less than half an hour.

The other adult bird now took up guard duty near by. Occasionally, it raised itself, swung its head to and fro, and readjusted itself. It never left its general position while I was present.

The mute swan usually lays five to seven eggs; however it has been known to lay nine.

Of four swan nests I studied, one contained nine eggs, one contained eight eggs, and the other two contained five and six eggs. In three of the nests one egg did not hatch.

One nest was built on high, dry ground beside a tree along the stream. The other nests were built in a semi-marsh away from the direct influence of the main stream. These nests consisted of a pile of sticks and other vegetable materials collected near by. The inside of each nest was lined with fine grass.

Three of the nests were neat circular mounds. The other amounted to a pile of material arranged without much form, and was sprawled out to a width of over four feet. The nest is generally a little wider at the base than the adult bird is long in body.

The eggs contained in these four nests hatched at about the same time on three different years. The hatching took place during the last part of the second week or the beginning of the third week in May.

Cygnets are able to feed and swim shortly after hatching. They are carefully protected during the first three or four weeks by the parent birds. One of the parents sees to it without fail that the little fellows remain very close to it. Great care is taken not to allow the youngsters to get caught in a stream current which will overpower them. The adult birds will fight off any swan invading the area in which the little swans are located. In fact, any potential enemy is very likely to be warned and, if the warning is not heeded, attacked. As the cygnets grow in size, they become more able to look after themselves and the parent birds are somewhat less careful in protecting them. The young remain with the adults throughout the summer. The adults will fight to protect their charges even in early fall at which time the cygnets are close to adult size.

It is even dangerous for a human being to investigate a nesting swan too closely or one which has charge of a brood of cygnets. The bird sitting on the nest will fight, however, only if the enemy insists on attacking the nest itself. Ordinarily this bird will not leave the nest. The real fighting is left up to the parent bird not sitting on the nest. This condition is true, too, when one of the parent birds has the cygnets gathered around it.

Make no mistake about how clumsy these birds may seem on land. They can move with great force and speed when forced to fight. They will not strike without warning, but the period of warning and bluff may be very short with birds not adjusted to man, or it may continue until one is far enough away from the nest so as not to arouse anymore apprehension from the bird standing guard.

Birds adjusted to man may even become so tame that they will allow one to come right up to the nest without being threatened; but my experience shows, in this case, that it is best to approach slowly with no evident intention to harm the nest. The guarding bird may at first show some alarm; but if it sees that you are not going to disturb the nest, it will leave you alone. However, do not try this if the guard bird hisses strongly, begins moving towards you, and even raises its wings a little while waddling towards you. If you do not move back, it is likely to change its attitude and prepare for a flying attack which you will have difficulty in getting away from once the bird engages with you. This flying attack is aroused by a quick, sudden approach to the nest; and it is more associated with birds not very well acquainted with man. Even very tame birds will use this form of attack if aroused enough.

It is very difficult to approach a bird with its young gathered around it, especially if they are just hatched. As a matter of fact, it is often

dangerous even with tame birds to do this. The guard bird is generally in a position which will require a minimum of time to take up the defense of its family. In the water these birds can swim with great speed, and move with great force when fighting.

Adult swans, accustomed to the ways of man, will gradually allow patient human observers to become friendly with their cygnets. They will allow you to feed them. But never try to pick up the young birds as this will prompt attack upon you by the adult birds. However, it is general for one of the adult birds to lead the young away from harm while the other stands by to fight if forced to do so.

It is best to use long focal length lenses on your camera when making pictures of these birds. This allows you to remain at a safe distance from them, and it gives you a good picture size, too. The author uses a 15 inch telephoto lens with a 4x5 Graflex Camera. Fast pan films such as Eastman Super XX or Ansco Super Pan Press are preferred since their speed allows pictures to be made at high speed, or in poorer light.

THE CYPRESS KNEE

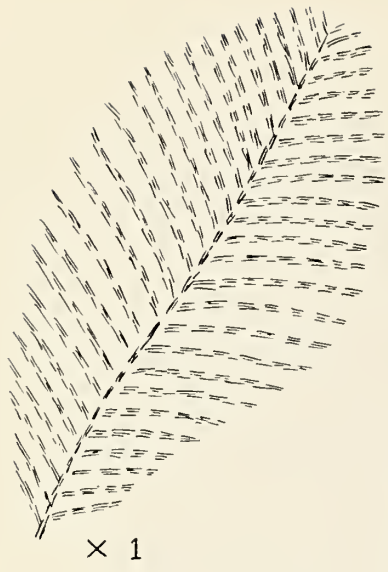
by

Irving L. Towers

When the Bald Cypress *(Taxodium distichum)* grows in areas where it must lead an amphibious existence the roots develop characteristic, vertical projections known as knees. Trees found growing either above the high-water line or in permanent waters, lack knees. In producing these attenuated humps the cypress is therefore taking a precautionary measure against a changing environment, or in other words, when a tree which has stood for several months above the water level is suddenly inundated by a seasonal flood, it needs an appreciable reserve to tide over until a readjustment can be effected. These quite variable members, numbering a score or more in some instances, may attain a height of from two to three feet.

A microscopic study of sections cut from several knees disclosed that they serve for the stockpiling of nutriments; thus we may infer that changing environments interfere temporarily with the roots' ability to obtain nutrients from the soil.

The readjustment depends primarily upon the activities of the minute, symbiotic fungi supplying the root with minerals, for like most trees of the forest, the cypress relies upon their assistance. This generally accepted view would seem to be borne out concurrently. It is a significant feature from the standpoint of adaptation on the part of the tree, for it transfers one of the roots' more important functions to an outside agency.



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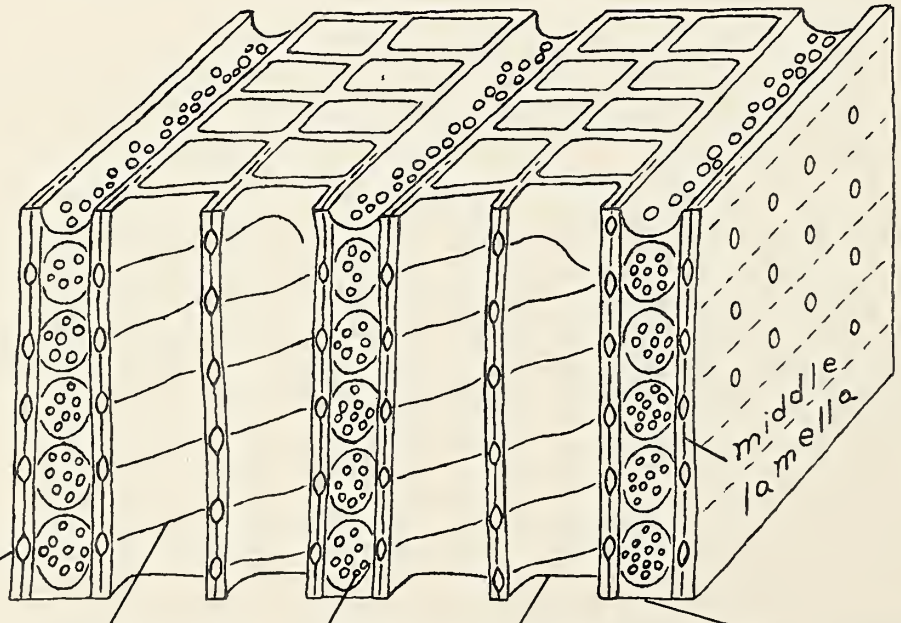
Tracing of a 12-yr., old knee of the Bald Cypress, Taxodium distichum (L.) L. C. Rich.

Proximal

Distal

* Diagrammatic block from knee magnified × 330.



× 330

× 330

bordered pit

Lamella—thread

nutri—ments

water—conductor

medullary ray

To return to the cypress knee, however, it is apparent that by being specialized along one particular line, another functional activity is necessarily concentrated in order that it may carry the extra burden. This second function pertains to respiration and its study indicates how, not only the knee but the entire root, obtain oxygen and enable this tree to thrive in a location where most would perish.

In order to secure an extra supply of oxygen from the water in its passage through the root, minute interceptors in the form of threads are stretched diametrically across the bore of the water-conductors of many trees. These threads are merely outward extensions of the lamella, as indicated in the larger figure. They increase the power of the bordered pits to absorb oxygen and make it possible to respire more freely. Textbooks state, in substance, that generally speaking a quart of water contains one teaspoonful of dissolved oxygen. This apparently is insufficient to maintain a submerged root system unless its power of absorption is augmented by an increase in the number of lamella-threads present. This also obtains, of course, where deciduous trees are concerned.

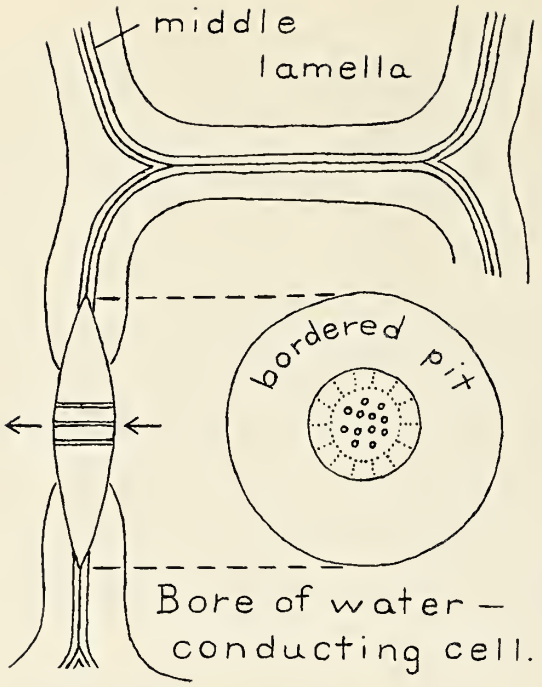
In order to clearly visualize this type of respiration it is necessary to study the plant in minute detail, for the intricate structure of the wood-cell is likely to be underestimated. By way of illustrating this point, at least one example is furnished by the arts and crafts. Here we find that a violinmaker, in selecting stock for one of his instruments, prefers materials which have seasoned for a full century, in order to obtain a high degree of resonance. Such an extended interval is hardly required for the evaporation from the cell cavities alone; close observation, however, shows the existence of a dense tissue sandwiched between the layers of cellulose and this middle layer desiccates only gradully.

This sheet of living tissue is known as the middle lamella and it secretes, bilaterally, the lifeless cellulose which makes up the cell wall proper. The middle lamella is not completely encased, however, for at intervals there are openings on opposite sides exposing differentiated, rounded areas which constitute the bordered pits.

The water, in its passage through the root, utilizes traverse ducts in the bordered pits as it is drawn from cell to cell and while negotiating these thickened sections of the lamella, a limited part of its dissolved oxygen is extracted. In addition to this appliance, many trees also require the aid of the previously mentioned lamella-threads to complement their efforts.

The derivation of the lamella-threads remained in doubt during most of this study for it seemed possible that they could be formed through a union of plastids or even chondriosomes. Subsequently, while examining the root of the Tulip Tree *(Liriodendron tulipfera)* it was seen that each thread secretes a sleeve of cellulose. This is also evident in the related magnolia, both roots being taken from a bottom-land area.

In the cypress, the exposed lamella on one side of the cell extends a bare thread which reaches across its diameter and contacts another bordered pit on the opposite side, thereby adding materially to the surface of



Diagrammatic section
of root of Longleaf Pine,
Pinus palustrus Mill., x 1,320.

absorption. These protoplasmic bridges are readily identified by their pink color which corresponds to that of the lamella proper. They are of necessity quite fine, their diameter being but one-fifth of that of the silk as spun by a large spider. They are also durable, showing no inclination to wilt.

Both the appearance and performance of these two cell-organs, the bordered pits and the lamella-threads, as well as the lamella, proper, would indicate the presence of iron, which in plants as well as in most other life, is the indispensable carrier of oxygen. It is said by authorities to be one of the more permanent elements, remaining practically stationary after reaching its place of operation. A contributing factor may be associated with the fact that in the Spring with a rising water level, the cut surface of the knee assumes a pinkish hue, probably due to accelerated respiration.

In order to make a detailed study of the bordered pit it is necessary to seek further than the cypress for here this cell-organ is comparatively small; hence, failing to disclose features which are, at best, quite infinitesimal. The aforementioned intercellular ducts were too small for clear discernment in this tree. They are clearly apparent, however, under full magnification in the root of the Longleaf Pine *(Pinus palustris)* which has a heavy lamella with prominent and fairly frequent threads. These giant pits may be tunnelled by as many as a dozen diminutive conduits. Since these specialized aqueducts have not been reported previously, they are designated as Fladung's ducts for Edmund B. Fladung of Baltimore. Their position is indicated by the arrows in the smaller drawing.

The persons that, some time in the distant past, named the cypress

knee were evidently prompted by the disparity in the diameters of the two attached roots corresponding to the leg and the thigh, respectively. A study of sections cut from each of these parts shows that the leg is a true root, while the thigh, in addition to its primary duty, helps the knee in stockpiling reserves.

The twin forces of competition and adversity have forged the cypress root into an organ of high precision where no iota of material or energy is wasted. One evidence of this is found in the orientation of the lamella-threads which invariably run crosswise to the radius, as indicated by the sketches of all three sections of the root. This arrangement causes them to contact the radial lamellae, exclusively, which obviously simplifies the problem of securing an even distribution of the oxygen. Another evidence of precision may be noted in the early developmental stages of the secondary rootlet where the cells are arranged with almost mechanical regularity. The thickened, radial septa found here may indicate that the immature rootlet depends, in part at least, on the older established member for its oxygen.

Notwithstanding the concentration of lamella-threads present in the knee, the inert storage cells would apparently still be left with an oxygen deficiency were it not for the fact that the tree elevates this member for further aeration. While this would seem in the nature of a minimal aid, this plant takes advantage of every resource to improve its economy. A stand found growing in a creek-bed, where the flow was moderately rapid, had skeins of the familiar, white, dangling rootlets undulating with the current. Sectioning showed that these also are organs of respiration although apparently operating on a different principle.

The cypress practically gives away its own riddle when a radial root section is examined, for by viewing the lamella-threads obliquely from their ends, they are actually magnified by the cell wall. In order to obtain an easily read, radial section, a finger-sized root is split down the middle, then the cutting is lifted from the previously smoothened, flat surface.

As a control for this aquatic tree of the bottom-lands, and upland member of the juniper family, namely the Red Cedar *(Sabina virginiana)* was selected. Its root, which is otherwise fairly similar to that of the cypress, possesses only a fraction of its lamella-threads. This is but another instance in which a complete adaptation to a new environment has required a notable adjustment. The time factor has, in all probability, been instrumental in making the cypress so comparatively adept.

It might be presumed that the maintenance of these myriad, specialized threads, throughout an extended root system, would tax the tree's economy to no slight degree. We know further that, according to the law of organic compensation, any major, specialized development can be attained only at the expense of curtailment elsewhere. This automatically leads the plant to dispense with its foliage and remain bald for a fair portion of the year. The complex make-up of the root also helps to account for the presence of the knee, for the conventional type root could not be expected to meet the demands of this composite structure in times of stress.

The cypress was chosen by the ancients as their symbol of

immortality and it is true that it often attains remarkable longevity. A stately specimen, growing in a nearby glen here in Central Florida, has an estimated age of well in excess of a millennium. It also has the reputation of being the largest known conifer east of the Mississippi. Botanists call it the "Seminole Cypress."

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1. Asch *The Story of Plants* (1948)

2. Small *Florida Trees* (1913)

3. Thone *The Microscopic World* (1940)

NOTES ON THE AMPHIBIANS AND REPTILES OF SOUTHERN MARYLAND

By John E. Cooper

During past years, few herpetological investigators in Maryland have been concerned with that portion of the state known as Southern Maryland, and collectors have mostly confined their activities to the areas surrounding, or readily accessible to, the city of Baltimore - the region called Central Maryland. Consequently, herpetological material from the lower inner Coastal Plain of the state is scarce, and the literature dealing with the herpetofauna of this region is sparse.

The following notes are based, for the most part, upon specimens collected, or observed, in St. Mary's and Charles Counties, two of the more neglected regions (most of the field work in southern Maryland has centered around Calvert, Prince George's, and Anne Arundel Counties), on occasional field trips during the spring and summer months of the years 1946 through 1951. Several noteworthy records for previous years are also included. The majority of those specimens collected are now contained in the herpetological collection of the Natural History Society of Maryland.

The Cedarville State Forest, herein mentioned many times, lies partly in Prince George's County and partly in Charles County. However, since there is no county-delineated change in the character of this area, no distinction is made in the notes.

Two annotated lists of species, one hypothetical, the other actual, are presented here. The hypothetical will serve to record discussions based on logically possible occurrences, inconclusive data, and refutations of assumptions considered by the author to be incorrect.

HYPOTHETICAL LIST[1]

*1. *Diemictylus viridescens viridescens*, Eastern newt. - Both forms of the newt, eft and aquatic, are known from the Coastal Plain of the western shore, but this writer has never seen a specimen from extreme southern Maryland. It is common in the spring in parts of Anne Arundel County to the north, and one specimen, a terrestrial eft, is reported from the Cedarville State Forest by Henry Howden.

*2. *Ambystoma tigrinum tigrinum*, Tiger salamander. - Known to this date only from the Eastern Shore, the tiger salamander should, nevertheless, be sought diligently in southern Maryland. Egg masses, believed to be of this species, were found in a swamp near the Cedarville State Forest on March 24, 1951, along with masses of eggs identified as those of *A. maculatum*. The area has not been revisited as yet, but it should prove to hold *tigrinum*. The habitat, however, is unlike Eastern Shore *tigrinum* habitats.

3. *Plethodon glutinosus glutinosus*, Slimy salamander. - It is interesting to note that, while this species occurs very abundantly in the Coastal Plain of many other states, and in the other regions of this state, it has not been recorded, to date, from the Coastal Plain of Maryland. It is nearly a certainty that, did *glutunosus* exist in Coastal Plain Maryland, it would have been found by this time. This assumption is based on its noticeable abundance elsewhere. In the event that it is merely a case of insufficient collecting, *glutinosus* may possibly turn up in southern Maryland.

*4. *Eurycea bislineata bislineata*, Two-lined salamander. - Although it can endure drier situations than can *Desmognathus*, the same condition probably exists for this species as for the latter.

5. *Eurycea longicauda longicauda*, Long-tailed salamander.- The general habitat of this salamander throughout most of its range in Maryland is characterized by moist, stony embankments and rock ledges, or caves and cave-fringe streams. These are lacking in the region under consideration.

*6. *Desmognathus fuscus fuscus*, Dusky salamander.- Throughout the Coastal Plain of the western shore there is a paucity of swift, highly-oxygenated streams, the characteristic habitat of *fuscus*. However, this form has been found in quiet water in other Coastal Plain counties, and undoubtedly occurs in Charles and St. Mary's, though probably in considerably less number than in the northern and western parts of its Maryland range.

7. *Scaphiopus holbrookii holbrookii*, Spadefoot toad.- The occurrence of the spadefoot toad in Anne Arundel and Prince George's Counties, and on the Del-Mar-Va Peninsula, makes it a prospective resident of the other Coastal

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[1] Since the preparation of this article, C. J. Stine, J. A. Fowler, and R. S. Simmons have definitely recorded the forms denoted by asterisk from the region under consideration. For notes concerning *A. t. tigrinum*, see "Occurrence of the eastern tiger salamander, *Ambystoma tigrinum tigrinum* (Green) in Maryland, with notes on its life history", "Annals Carnegie Mus., Vol. 33, Art. 7, March 8, 1954."

Plain Counties. It is a secretive species, living diurnally underground for the most part, and has only been found in quantity nocturnally, at breeding time. Undoubtedly it occurs in this region and will turn up as a result of more exhaustive collecting.

8. *Acris gryllus crepitans*,- Undoubtedly abundant in the area under consideration.

9. *Hyla andersonii*, Anderson's tree frog.- This frog's odd distribution, jumping from fixed areas in North and South Carolina, to southern New Jersey, makes its occurrence in suitable areas of Maryland a possibility. But, the chance of its appearing in Charles and St. Mary's Counties is considered by the writer to be remote.

10. *Hyla femoralis*, Pine-woods tree frog.- Known in this state only from Battle Creek, Calvert County. If this species is indigenous, which the writer very much doubts, it will undoubtedly occur in other parts of the Coastal Plain.

11. *Rana virgatipes*, Carpenter frog.- Recorded in Maryland from the Del-Mar-Va Peninsula only. Though unlikely, it may occur in the sphagnaceous swamps of southern Maryland.

*12. *Microhyla carolinensis carolinensis*, Narrow-mouth frog. Collections indicate that this frog is restricted to the southern tip of Calvert County. However, Romeo Mansueti, collecting with the writer at night in a pond at Hay's Beach, near Ridge (see *Hyla cinerea* in the list of species) was certain that he heard the voice of *Microhyla* among the mating songs of other species. Subsequent collecting revealed no specimens of this frog, but the species does, in all probability, occur elsewhere in southern Maryland. St. Mary's County, especially the southern portion around Point Lookout and Point-No-Point, which lies south of the known localities, is the most likely spot.

13. *Abastor erythrogrammus*, Rainbow snake.- One record exists for this snake in Maryland - Stump Neck, Indian Head, Charles County. Since the rainbow snake has been found in Charles County, it should also be found in St. Mary's, if it is to occur further in Maryland at all. *Abastor* is a very secretive form, and only diligent search could possibly result in its future capture.

14. *Diadophis punctatus punctatus*, Ring-necked snake.- See the discussion under *D. p. edwardsii* in the list of species.

15. *Elaphe obsoleta quadrivittata*, Chicken snake.- Kelly, Davis and Robertson[2] list two adult specimens captured near St. Mary's City, St. Mary's County, in 1928 and 1930 respectively. These snakes, if indeed *quadrivittata*, were undoubtedly escapes from somewhere in the area. It is certain that *quadrivittata*, as the authors themselves suggest[3] and with which view McCauley[4] agrees, is not indigenous to Maryland.

16. *Lampropeltis calligaster rhombomaculatum*, Mole snake.- This snake has been

taken quite often in Prince George's County. Several individuals are also known from Anne Arundel County; but, it is not recorded from Charles and St. Mary's Counties as yet. It will no doubt come to light eventually.

17. *Cemophora coccinea*, Scarlet snake.- Eight of the nine recorded specimens from Maryland are from the western Coastal Plain. There have been rumors of "coral snakes" in the Charles-St. Mary's area, and these could refer either to this species or to *Lampropeltis doliata temporalis*. Whatever their origin, further collecting will undoubtedly see *coccinea* taken in this region. It is a secretive, fossorial snake, a fact attested to by the rarity of collected specimens from the state, only nine having been authentically recorded in the past eighty-nine years![5]

18. *Natrix erythrogaster erythrogaster*, Red-bellied watersnake.- McCauley[6] mentions an unusual water snake recorded in the diary of the late Father William H. McClellan, S. J., which Father McClellan caught at St. Inigoes, and about which he says, "I think it must have been a copper-belly." McCauley further suggests that *erythrogaster* probably "...inhabits suitable places in the extensive cypress swamps of the southern parts of Maryland." To date it has only been found on the Eastern Shore.

19. *Natrix septemvitatta*, Queen snake.- Again, swift streams and a specific item of diet play a large part in the distribution of a species, and few specimens of this snake are known from the Coastal Plain. It feeds almost exclusively on crayfish and possibly will be found where these crustaceans abound in our area.

20. *Natrix taxispilota*, Water pilot.- If *taxispilota* were found anywhere in Maryland it would most logically occur in the southernmost counties of the western Coastal Plain. But, even this part of the state is far out of the range of *taxispilota*, and non has ever been found in St. Mary's or Charles Counties (or anywhere else in the state) that was identified definitely as this species. The allusion to its occurring "...all over the state,"[7] by Kelly, *et al.*, is refuted by McCauley.[8]

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2 Howard A. Kelly, *et al.*, *Snakes of Maryland* (Baltimore, 1936), p. 57.

3 *Ibid.*, p. 58.

4 Robert H. McCauley, *The Reptiles of Maryland and the District of Columbia* (Hagerstown, 1945), p. 24.

5 John E. Cooper, "The Scarlet Snake (*Cemophora coccinea*) in Maryland," *Maryland Naturalist* No. 4, 1950, pp. 67-9.

6 *Op. cit.*, pp. 102-3.

7 *Op. cit.*, p. 77.

8 *Op. cit.*, p. 24.

21. *Ancistrodon contortrix mokeson,* Southern copperhead. - The 6th edition of the checklist[9] shows this form and A. c. *contortrix* as both occurring in this state, contortrix being listed from the Maryland coastal plain. There is no evidence, to date, to support the theory that two subspecies occur here, although specimens from sothern Maryland exhibit some characteristics of *contortrix.* McCauley[10] regards the southern tip of St. Mary's County as a probable area of intergradation of the subspecies.

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9 Karl P. Schmidt, *A Check List of North American Amphibians and Reptiles* (Chicago, 1953), 6th Ed., p. 224.

10 *Op. cit.,* p. 130.

LIST OF SPECIES

1. *Ambystoma maculatum,* Spotted salamander. - Egg masses of this salamander were found by J. Gentile and the writer on the night of March 23, 1951 in small ponds in the Zekiah Swamp, Cedarville State Forest. Many more were found, along with eggs identified as thos of *A. t. tigrinum,* on the morning of March 24, 1951 in a swamp near the Forest. Probing in mud, and in and under grass tufts, leaves, and logs in water failed to produce adults, although this method was responsible for the discovery of adult *maculatum* in a similar swampy-pond in Calvert County. Egg masses were also found by T. W. Owens and the writer on April 25, 1949 in a pool near a sawdust pile in the Doncaster State Forest area.

2. *Ambystoma opacum,* Marbled salamander.- An adult specimen was found at 0850, May 2, 1949 under a small log in a wooded section near the intersection of routes 5 and 224 south of Leonardtown, St. Mary's County. Larvae were extremely numerous in ponds in the Cedarville State Forest on the night of March 23, 1951. As many as twenty or thirty individuals could be observed, in the area covered by a flashlight beam encirclement, swimming above the leaves and silt covering the bottom of a small pond near Forest Road.

3. *Hemidactylium scutatum,* Four-toed salamander.- One specimen was found by M. F. Groves on the Nicholson Farm, app. 1½ miles northwest of Benedict, Charles County, on March 16, 1946. Another was found by D. N. Oler on July 27, 1947 under a log in a moist lumber-log pile in the Cedarville State Forest; in the same pile were *Pseudotriton montanus montanus* and *P. ruber ruber.* Innumerable *scutatum* were found by Owens, F. R. Atwell, and the writer, at 1100, April 25, 1949 in a sphagnum bog in the Cedarville State Forest. Most of the specimens collected were females with their eggs. The eggs were deposited under moss and among the roots of moss on logs near small pools of water. A few groups were found under logs and bits of wood on the ground, also near water. The salamanders were found in an area estimated to be not larger than

20 x 35 feet, and were, in this particular case, restricted to the bog. Many individuals of this species were found by Gentile and the writer in a swamp near the entrance to the Cedarville State Forest, on the morning of March 24, 1951. All were females with egg masses, found under and among sphagnum moss on logs or stumps over water. Nearly all of the specimens, when disturbed, refused to move from their eggs, even when touched; two, however, scurried into the water when exposed. Also found in the same swamp were egg clusters of *Rana sylvatica sylvatica* and salamander egg masses identified as *A. maculatum* and *A. t. tigrinum*. Singing *Hyla crucifer* and *Pseudacris nigrita feriarum* were present.

4. *Plethodon cinereus cinereus*, Red-backed salamander.- Four specimens were found on March 16, 1946 near Benedict by Groves. One was found under a log, and another under the bark of a log, in the Doncaster State Forest, on April 25, 1949 by Owens. On the night of March 23, 1951, a lead-backed individual was discovered emerging from submerged moss in a small pool app. 3 inches deep, near Loop Trail, Cedarville State Forest. Water temperature 13° C. (55.4°F.).

5. *Pseudotriton montanus montanus*, Baird's red salamander.- Several of this species were discovered by R. Mansueti, D. N. Oler, and the writer on July 27, 1947 in the Cedarville State Forest. One was under a rusty bucket; the others were in a moist lumber-log pile containing considerable leaf mold.

6. *Pseudotriton ruber ruber*, Red salamander.- On July 27, 1947, Groves and Mansueti found two specimens in the Cedarville State Forest. Another was found on April 25, 1949 under a small log in the Doncaster State Forest, Charles County.

7. *Bufo terrestris americanus*, American toad.- Two were observed calling from a small pool off Forest Road in the Cedarville State Forest, at 2030, March 23, 1951, by Gentile and the writer. A female was floating in the middle of the pool. *Rana s. sylvatica*, eggs of *sylvatica*, and larval *A. opacum* were also in the pool. Air temperature 17.5°C. (63.5°F.); water temperature 12°C. (53.6°F.). The night was slightly breezy, and brief showers fell intermittently. A single male was found at 2200 hopping across Mistletoe Trail.

8. *Bufo woodhousii fowleri*, Fowler's toad.- Two were found hopping about in the rain in a glade near Beachville, St. Mary's County, on May 2, 1946 by Mansueti and three more were found here the following day. J. E. Norman caught several on July 4, 1946 at Chancellor's Point. On the same day, in this locality, eggs and tadpoles of this toad were found in small, road-side puddles. A specimen was taken at Indian Head, June 15, 1947.

9. *Pseudacris nigrita feriarum*, Swamp tree frog.- On the night of March 23, 1951, at 1900, a chorus of better than a hundred *feriarum* was found by Gentile and the writer in a small (app. 15 X 35 feet) pool in a sand pit in the Cedarville State Forest. The shallow pool, which is probably transient, varied in depth from app. 3 to 12 inches, and the bottom was covered with a variety of horse-tail moss. A slight, intermittent rain was falling. Air temperature 17.5°C. (63.5°F.); water temperature 13°C. (55.4°F.). *Pseudacris* were heard all night in marshy areas throughout the Forest, often in conjunction with *crucifer*. They were also heard the following morning, both before and after daybreak.

10. *Hyla cinerea cinerea* X *evittata*,[11] Green tree frog.- Hundreds of these beautiful tree frogs were found breeding in a moderate-sized marsh directly adjacent the Chesapeake Bay at Hay's Beach near Ridge, between 2100 and 2400, June 22, 1946. The following field notes were made by Mansueti, Oler, and the writer: The night was rainy,humidity high, air temperature 23°C. (73.4°F.); cattails bordered the marsh and edges of the large, stationary pond which lay between the marsh and the Chesapeake shore; dead, matted vegetation and debris filled the water and, in some places, created platforms extending from the shallow water near the pond's edge to the deeper water of the center; the species was not heard calling during daylight hours, but after dark its serenading was nearly deafening; its call was a loud, continuous, spontaneous "quonk"; *Bufo w. fowleri, Rana pipiens,* and *Hyla v. versicolor* were heard singing in chorus with the *cinerea;* the latter were easily collected and flattened themselves against the cattails when disturbed; if touched or knocked from their perch, they would jump away in long, flying leaps across the matted grass, or would hop in short, fast jumps, *seemingly along the surface of the water,* to an outcrop of debris; amplecting pairs would often leap away in embrace and, if separated, the males would invariably take up singing again; specimens were found clasping on tufts of bent grass; eggs were being laid; water snakes were abundant in both the pond and marsh, and were observed, on several occasions, pursuing the frogs; one *sipedon* regurgitated a *cinerea* when captured.

The specimens from this locality seem to exhibit characteristics of both *cinera* and *evittata* and, although no careful study has as yet been made, the population would appear to be intermediate between the two forms. Dunn, as indicated, assigns upper Potomac tidewater groups to the subspecies *evittata*. All other Maryland populations, according to him, should be considered intermediate.

11. *Hyla crucifer crucifer,* Spring peeper.- Choruses of "peepers" were heard by Gentile and the writer in a large swamp near the entrance to the Cedarville State Forest, and in swamps and marshy areas throughout the Forest, from our arrival at 1600 until well after 2300, March 23, 1951. Air temperature varied no more than 1°C. during this period, from 18° (64.4°F.) at 1600, to 17° (62.6°F.) at 2300. Often *P. n. feriarum* were singing with the *crucifer,* but in nowhere near the latter's number. Choruses were heard on March 24, 1951, from 0900 until our departure at 1230.

12. *Hyla versicolor versicolor,* Grey tree frog.- On May 2, 1946, in a roadside glade near Beachville, a single male was found perched on

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11 Emmett Reid Dunn, "The Status of *Hyla evittata* Miller," *Proc.Biol, Soc.Wash.,* February 23, 1937, 50:9-10.

shrubbery app. 6 feet above the ground. The day was rainy, temperature high, and the specimen was singing with others of the species. No water was seen in the area nearby. An individual was found at 2100, June 22, 1946, in a large fresh-water marsh directly adjacent to the Chesapeake Bay at Hay's Beach. It was on a cattail reed, singing with a group of *cinerea*. Intermittent showers were falling. Eggs of the species were found in roadside puddles at Indian Head, Charles County, and several were heard singing on May 2, 1949, near Beachville.

13. *Rana clamitans*, Green frog.- Many green frogs were observed by the writer in a small, stagnant pool off route 205, 3 miles south of Beachville, on June 22, 1946. A large male was found on July 27, 1947 in the Cedarville State Forest by Mansueti. L. Lemay and A. Marsiglia collected this species at Chancellor's Point in 1949. Many were seen by the writer in a pool near a sawdust pile in the Doncaster State Forest area on April 25, 1949. One large individual was found in the Zekiah Swamp, Cedarville State Forest, on the night of March 23, 1951. Several others were collected in a swamp near the Forest entrance the following day.

14. *Rana palustris*, Pickerel frog.- A single specimen was collected in the Cedarville State Forest on July 27, 1947 by Mansueti and the writer.

15. *Rana pipiens*, Leopard frog.- A great many leopard frogs in all stages of development, including many adults, were found in the marsh and pond at Hay's Beach on the night of June 22, 1946. One specimen was collected on July 4, 1946 at Chancellor's Point.

16. *Rana sylvatica sylvatica*, Wood frog.- One adult male and several clusters of eggs in late stages of development were found in a pond with singing *Bufo t. americanus* and larval *A. opacum* on the night of March 23, 1951, in the Cedarville State Forest. Water temperature 12°C. (53.6°F.). Eggs of this species were also found, along with *Ambystoma* eggs, in a pond in Zekiah Swamp, on the same night. Water temperature 10°C. (40°F.). Egg clusters were also found in the swamp near the Forest entrance the following morning.

17. *Sceloporus undulatus hyacinthinus*, Eastern fence swift.- A juvenile was found at 1430, May 2, 1946, in a glade near Beachville. The day was rainy; air temperature 23.9°C. (75°F.). A gravid female was taken at St. Mary's City on July 4, 1946. This species has been found to be extremely abundant in the area under consideration.

18. *Cnemidophorus sexlineatus*, Six-lined racerunner. - An adult was taken on July 12, 1947, by Mansueti and the writer, at Indian Head. Several others were observed there. The writer observed this species to be abundant in the summer of 1947 in sand pits in the Cedarville State Forest.

19. *Lygosoma laterale*, Ground skink.- Groves found a specimen on August 10, 1946, in the Cedarville State Forest. One example was found by Oler under a log on moist, sandy soil on the north bank of Mattawoman Creek at Indian Head on June 15, 1947. The day was cool, clear, and sunny, and the lizard was sluggish, not at all like the normal *laterale*, which is anything but sluggish.

20. *Eumeces fasciatus*, Five-lined skink.- An adult female was found on June 15, 1947, by Oler. It was under a rotting log in a heavily wooded area on a slope above Mattawoman Creek. Another individual was observed on the protruding roots of a tree growing on a steep bank three feet above the water. On this same day, at 0930, two females were found under rotting logs along the roadside, coiled about their eggs in depressions in the sandy soil. Each complement contained eight eggs. One other female, with a group of nine eggs, was found in a cavity under the bark of a large, decomposing pine log. A medium-sized specimen, startled from under a tin can on the shore, scurried into Mattawoman Creek to avoid capture. An adult male was taken on July 27, 1947, in the Cedarville State Forest by Groves. Several specimens were seen by the writer at Indian Head, on logs with S. u. *hyacinthinus*.

21. *Eumeces laticeps*, Greater five-lined skink.- One specimen was taken at Beachville on May 2, 1946, by Mansueti.

22. *Carphophis amoenus amoenus*, Worm snake.- A worm snake was found in a decomposing pine log near Beachville on June 23, 1946 by Mansueti and the writer. On May 2, 1949, at a sawdust pile in a cutover region south of Leonardtown, another *amoenus* was found, under a piece of bark.

23. *Diadophis punctatus edwardsii*, Edward's ring-necked snake.- One specimen was taken at 1220, August 10, 1947, under the outer shell of a rotting log in an oak-hickory wood near "Wolf's Den" in the Cedarville State Forest. Although McCauley[12] believes that *D. p. punctatus* occurs in southern Maryland, Groves, who is in the midst of a study of *Diadophis* from the southern counties, has as yet found no evidence to support this idea. He has been kind enough to inform the writer that, of the specimens he has examined, none exhibit the low ventral and subcaudal count (191 greatest sum) characteristic of *punctatus*. Nor do they possess ventral spotting to any degree, or narrow, broken or constricted neck rings.

24. *Heterodon platyrhinos platyrhinos*, Hog-nosed snake.- A specimen was taken by the writer at 0930, June 23, 1946, in a pine barren 3 miles south of Beachville, just off route 205. The day was warm, clear, and dry; the snake was lying along, and partially under, a recently cut pine log.

25. *Coluber constrictor constrictor*, Black racer.- At 1500, May 2, 1946, J. Hamlet found a juvenile racer in a partly wooded section near Beachville. This snake was in the open, lying by the side of a stump. The sky was overcast and rain was falling. A dead adult was found by the writer on June 23, 1946, 5 miles south of Leonardtown on route 205. It was in perfect condition, bearing no marks of violence. A meadow and partly wooded area were nearby. An adult male was found DOR[13] just south of Leonardtown on May 2, 1949. Owens captured two large racers in a drying, mossy bog south of Leonardtown on the same date. One was on an inclined log. Several individuals were taken by Groves on April 15, 1942 near Benedict.

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12 *Op. cit.*, pp. 58-61.

13 Dead on road.

26. *Elaphe guttata guttata,* Corn snake. On May 2, 1949, at the junction of routes 244 and 205 south of Leonardtown, Owens and the writer found a dead specimen of this snake measuring app. 1079 mm. (3'6½"). Groves collected a very large specimen near Benedict on April 15, 1942.

27. *Lampropeltis getulus getulus,* King snake.- A very large, freshly killed example was found on June 22, 1946 app. 4 miles south of Leonardtown on the side of route 205, still wriggling when discovered. We later spoke to a laborer, who had killed the snake, and he could apply no local name to the species. Mansueti found a medium-sized individual under a piece of tin in an open field bordered by woods and a dirt road, near Beachville, on May 2, 1946. This species was commonly observed DOR throughout St. Mary's County in 1946.

28. *Lampropeltis doliata temporalis,* Coastal Plain Milk snake.- At 0945, May 2, 1946, Mansueti found a young male under a board near the edge of a cut-over wooded area, forty yards from route 235 near Mechanicsville, St. Mary's County. The snake was coiled and, though it tried to escape, it did not bite or exude musk when grasped. Water-filled ditches were nearby. The day was rainy,all undergrowth was very moist, the humidity was high, and the air temperature was 23.9°C. (75°F.). The snake measured 292 mm (11½"). An adult female was found dead on route 205 app. 1 mile south of Leonardtown on June 22, 1946, by the writer. It was found near a wooded area, through which was running a clear, freshwater stream. The soil was sand-gravel, and meadows and farmland were part of the immediate area. The snake, found at 1230, had been killed about an hour earlier. It possessed no ventrolateral blotches, and had eighteen dorsal saddles, arranged in one row. These descended to the first row of scales but did not extend onto the venter, except on the tail, where they edged the caudals just below the anus. Ventrals numbered 190, caudals 89; the neck pattern was a pure collar, the blotches were vivid orange-red. Total length - 476 mm (18.7").

29. *Natrix sipedon sipedon,* Common water snake.- Two specimens were taken at 2300, June 2, 1946, at Hay's Beach. These snakes, and many others of this species, were swimming about in the pond described under *Hyla cinerea,* their heads well elevated above water, hunting the frogs breeding in the pond. One of the captured individuals regurgitated a *cinerea.* All bit viciously when collected. Mansueti found one specimen on June 15, 1947, in the Cedarville State Forest. Groves captured one near Benedict on April 15, 1942

30. *Storeria occipitomaculata occiptitomaculata,* Red-bellied snake.- A red-bellied snake was found dead on route 205 app. 2½ miles south of Beachville on June 23, 1946. It had been dead for several days.

31. *Haldea valeriae valeriae,* Ground snake.- One specimen was found dead on route 205 nearly opposite the *occipitomaculata* listed above.

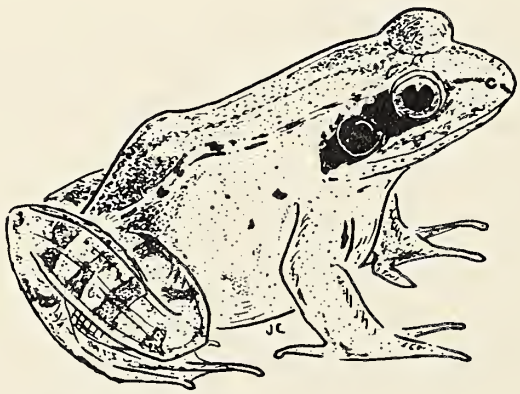
32. *Kinosternon subrubrum subrubrum,* Mud turtle.- A shell and a live specimen of this turtle were found by Mansueti and the writer on June 15, 1947 at Indian Head.

33. *Chelydra serpentina serpentina,* Snapping turtle.- A dead specimen was found just above a small stream on the highway near LaPlata, Charles County. One was found by Groves on April 15, 1942 near Benedict. Many large turtles, some of which appeared, from a distance, to be this species, were observed off-shore in Mattawoman Creek at Indian Head on June 15, 1947.

34. *Clemmys guttata,* Spotted turtle.- One specimen was taken at 1625, March 16, 1946, app. $\frac{1}{4}$ mile east of Hughsville, Charles County, by Groves. The turtle was in a marshy, fresh-water stream near a swamp. Air temperature 12.2°C. (54°F.), day cloudy. At 2200, March 23, 1951, Gentile and the writer found a single *guttata* with its head protruding above the water of a small pool in the Zekiah Swamp, Cedarville State Forest. It appeared that the turtle had come from under the log which was directly beneath it on the bottom of the pool. Silt on the pool bottom was deep, and underlined with logs and branches. Air temperature 17.5°C. (63.5°F.), water temperature 10°C. (50°F.). *C. guttata* appears to be the first turtle out of hibernation in the area.

35. *Terrapene carolina carolina,* Box turtle.- The intact shell of a small specimen was found on June 23, 1946, in a pine woods near Beachville. One example was found under a log in the Cedarville State Forest on April 25, 1949, by Owens and the writer. This turtle has been found to be extremely abundant throughout both counties.

36. *Chrysemys picta picta* Painted turtle.- An individual was found by T. M. Oler on June 15, 1947, at Indian Head. Another was found on April 25, 1949, in a small stream in the Cedarville State Forest. The day was sunny and warm; it had been very cool in the morning. An example of this species was taken near Benedict on April 15, 1942 by Groves.



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